**Request for Reconsideration:**

Applicants are amending claims 1, 18, 20, and 22 to clarify the structural elements of the fryer and are cancelling claims 23-40, without prejudice. Applicants maintain that means for selectively activating and deactivating as an element of a controller for deactivating and reactivating means for heating and for comparing the first signal to the second signal to determine a difference between the first temperature and the second temperature and compares the second temperature or the temperature difference to a predetermined temperature and means for measuring an amount of time and for counting the number of times that the at least one predetermined condition is satisfied, are disclosed in or are inherent in the disclosure of the specification, including the drawings and the original claims, and would be apparent to a person or ordinary skill in the art from Applicants disclosure. See, e.g., Appl'n, Paras. [0024]-[0032]; **Figs. 1-3** and **6**; see also McGraw-Hill Dictionary of Scientific and Technical Terms, 152 (4th ed. 1989) (An "automatic controller" is "[a] computer which can carry out a special set of operations without human intervention," copy enclosed);[1] E. Avallone and T. Baumeister III, Mark's Standard Handbook for Mechanical Engineers, 16-25 (9th ed. 1987) (An "automatic controller" is "[a] device, or combination of devices, which measures the value of a variable, quantity or condition, and operates to limit deviation of this measured value from a selected command (set-point) reference," copy enclosed) Moreover, they are indicative of "[t]he claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made." MPEP 2173.02.

The functions described in the claims, as originally filed, are clearly linked to the controller disclosed in the specification (see MPEP 2181(IV)), and the Office Action does not dispute that the controller is a structural means of the disclosed invention that performs these functions. Office Action, Page 2, Lines 17-21; Page 7, Lines 1-10. Instead, the Office Action contends that because of the manner in which Applicants have described these functions in the claims, the functions are statements of intended use, which are entitled to no patentable weight. Id. Therefore, Applicants have described the invention as claiming elements described in functional terms. 35 U.S.C. § 112, ¶ 6.

No new matter is added by the foregoing amendments, and these amendments are fully supported by the specification. Applicants respectfully request that the Examiner reconsider the above-captioned patent application in view of the foregoing amendments and the following remarks.

---

[1] In McGraw-Hill Dictionary of Scientific and Technical Terms, 427 (4th ed. 1989), the definition of "controller" states "*See* automatic controller."

**Remarks:**

1. Rejections

Claims 1-5, 7-11, 14-16, and 18-22 stand rejected under 35 U.S.C. § 102(b), as allegedly being anticipated by U.S. Patent No. 4,539,898 to Bishop et al. ("Bishop"). Moreover, claim 6 stands rejected under 35 U.S.C. §103(a), as allegedly being rendered obvious by Bishop in view of U.S. Patent No. 5,910,206 to McNamara, and claims 12 and 13 stand rejected under 35 U.S.C. § 103(a), as allegedly being rendered obvious by Bishop in view of U.S. Patent No. 6,427,580 to Benedictus et al. ("Benedictus"). In addition, claim 17 stands rejected under 35 U.S.C. § 103(a), as allegedly being rendered obvious by Bishop in view of U.S. Patent No. 5,776,530 to Davis et al. ("Davis"). Applicants respectfully traverse.[2]

2. Anticipation Rejections

As noted above, the Office Action rejects claims 1-5, 7-11, 14-16, and 18-22 as allegedly being anticipated by Bishop. "A claim is anticipated if and only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference" MPEP 2131. The Office Action asserts that Bishop discloses each and every element of claims 1-5, 7-11, 14-16, and 18-22. Applicants respectfully traverse.

As Applicants' previously have remarked, "a functional limitation is an attempt to define something by what it does, rather than by what it is. There is nothing inherently wrong with defining some part of an invention in functional terms. Functional language does not, in and of itself, render a claim improper. A functional limitation is often used in association with an element, ingredient, or step of a process to define a particular capability or purpose that is served by the recited element, ingredient, or step." MPEP 2173.05(g). The Office Action, however, fails to demonstrate that Bishop discloses these functional limitations.

In an effort to expedite the prosecution of this application, Applicants are amending claims 1, 18, 20, and 22 to describe the structural limitations that are inherently disclosed by these functional limitations. Applicants' independent claim 1 describes that the controller including:

> ***means for selectively activating and deactivating the means for heating, based at least on the second temperature***, wherein the means for activating and deactivating is electrically coupled to the first temperature sensor and to the second temperature sensor, wherein the means for activating and deactivating receives the first signal, receives the second signal, and deactivates the means for heating when at least one predetermined condition is satisfied, wherein the means for selectively activating and deactivating compares the first signal to the second

[2] In view of the cancelation of claims 23-40, the rejections of those claims are deemed moot.

> signal to determine a difference between the first temperature and the second temperature and compares the second temperature or the temperature difference to a predetermined temperature and the at least one predetermined condition is at least one condition selected from the group consisting of:
>
> the second temperature is greater than or equal to the particular predetermined temperature; and
>
> the temperature difference between the second temperature and the first temperature is greater than or equal to a predetermined temperature difference.

(Emphasis added.) Even assuming *arguendo*, that the Office Action is correct in its analysis of the claims as originally filed, that analysis does not apply the proper standard for reviewing means-plus-function elements, as set forth in the amended claims.

In contrast to Applicants' claimed invention, as set forth in amended claim 1, Bishop merely describes that a heat sensor 94 is positioned in a vat 82, such that heat sensor 94 is covered with a cooking oil 96; a temperature probe 160 is used to monitor the temperature of vat 82; and when the temperature of vat 82 drops to a predetermined amount below a value set on a temperature setting means 162, a switch means closes to apply power to a heater unit 156. See, e.g., Bishop, Column 8, Lines 59-63. As such, Bishop does not disclose or suggest deactivating the means for heating when at least one of the predetermined conditions from independent claim 1 is satisfied.

The Office Action asserts that "the operation of the controller is not structurally limiting [because] . . . [t]he operational steps are intended use and the one definitive structural limitation is that of a controller. Bishop discloses all of the structural limitations of the claim." Office Action, Page 7, Lines 4-7. The Office Action has yet to consider whether Bishop discloses that its controller deactivates the means for heating when the temperature of the vessel wall is greater than or equal to a predetermined temperature and/or when the difference between the temperature of the vessel wall and the temperature the cooking medium (or air within the cooking medium) is greater than or equal to a predetermined temperature difference, as set forth in independent claim 1. Thus, the Office Action's previous assertions that Bishop merely needs to describe any controller in order to disclose Applicants' claimed controller, clearly are inappropriate to the examination of Applicants mean-plus-function elements. Because each of these functions is performed by the controller, the controller describes a structure corresponding to the "means for activating and deactivating."

3. Obviousness Rejections

As noted above, the Office Action rejects claims 6, 12, 13, and 17 as allegedly rendered obvious by various references in combination with Bishop. As noted above, the Office Action has not shown Bishop discloses each and every element of the amended claims. Claims 6, 12, 13, and 17 depend directly or indirectly from allowable, independent claim 1. "If an independent claim is non-obvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious." MPEP 2143.03 (citations omitted). Therefore, Applicants respectfully request that the Examiner withdraw the obviousness rejections of claims 6, 12, 13, and 17.

**Conclusion:**

Applicants submit that the above-captioned patent application, as amended, now is in condition for allowance, and such disposition is earnestly solicited. If the Examiner believes that the prosecution of this application may be furthered by discussing the application, in person or by telephone, with Applicants' representative, we would welcome the opportunity to do so. Applicants believe that only the RCE fee (Fee Code 1801) and the fee for a four-month extension of time to file Appeal Brief (Fee Codes 1254) are due as a result of the filing of this responsive amendment. Nevertheless, in the event of any variance between the fees determined by Applicants and the fees determined by the U.S. Patent and Trademark Office, please charge or credit any such variance to the undersigned's Deposit Account No. 02-0375.

Respectfully submitted,

BAKER BOTTS L.L.P.

Dated: June 15, 2007

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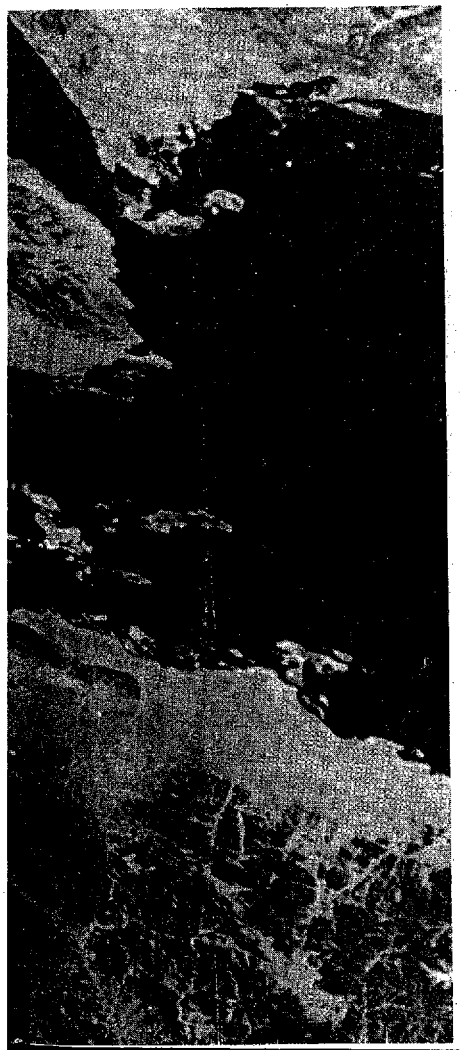

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In addition, material has been drawn from the following references: R. E. Huschke, *Glossary of Meteorology*, American Meteorological Society, 1959; *U.S. Air Force Glossary of Standardized Terms*, AF Manual 11-1, vol. 1, 1972; *Communications-Electronics Terminology*, AF Manual 11-1, vol. 3, 1970; W. H. Allen, ed., *Dictionary of Technical Terms for Aerospace Use*, 1st ed., National Aeronautics and Space Administration, 1965; J. M. Gilliland, *Solar-Terrestrial Physics: A Glossary of Terms and Abbreviations*, Royal Aircraft Establishment Technical Report 67158, 1967; *Glossary of Air Traffic Control Terms*, Federal Aviation Agency; *A Glossary of Range Terminology, White Sands Missile Range, New Mexico*, National Bureau of Standards, AD 467-424; *A DOD Glossary of Mapping, Charting and Geodetic Terms*, 1st ed., Department of Defense, 1967; P. W. Thrush, comp. and ed., *A Dictionary of Mining, Mineral, and Related Terms*, Bureau of Mines, 1968; *Nuclear Terms: A Glossary*, 2d ed., Atomic Energy Commission; F. Casey, ed., *Compilation of Terms in Information Sciences Technology*, Federal Council for Science and Technology, 1970; *Glossary of Stinfo Terminology*, Office of Aerospace Research, U.S. Air Force, 1963; *Naval Dictionary of Electronic, Technical, and Imperative Terms*, Bureau of Naval Personnel, 1962; *ADP Glossary*, Department of the Navy, NAVSO P-3097.

**McGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS, Fourth Edition**



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television receiver to keep color intensity levels essentially constant despite variations in the strength of the received color signal; control is usually achieved by varying the gain of the chrominance band-pass amplifier. Also known as automatic chroma control; automatic chrominance control. { ˌȯd·əˌmad·ik 'kəl·ər kənˌtrōl }

**automatic computer** [COMPUT SCI] A computer which can carry out a special set of operations without human intervention. { ˌȯd·əˌmad·ik kəm'pyüd·ər }

**automatic connection** [ELECTR] Ability of electronic switching equipment to make a connection between users without human intervention. { ˌȯd·əˌmad·ik kə'nek·shən }

**automatic contrast control** [ELECTR] A circuit that varies the gain of the radio-frequency and video intermediate-frequency amplifiers in such a way that the contrast of the television picture is maintained at a constant average level. { ˌȯd·əˌmad·ik 'kānˌtrast kənˌtrōl }

**automatic control** [CONT SYS] Control in which regulating and switching operations are performed automatically in response to predetermined conditions. Also known as automatic regulation. { ˌȯd·əˌmad·ik kənˌtrōl }

**automatic control balance** [ENG] An automatic balance fitted with an accessory which determines whether a package has been filled within preselected limits. Also known as checkweigher. { ˌȯd·əˌmad·ik kənˌtrōl ˌbal·ənsˌ }

**automatic-control block diagram** [CONT SYS] A diagrammatic representation of the mathematical relationships defining the flow of information and energy through the automatic control system, in which the components of the control system are represented as functional blocks in series and parallel arrangements according to their position in the actual control system. { ˌȯd·əˌmad·ik kən'trōl 'bläk ˌdī·əˌgram }

**automatic-control error coefficient** [CONT SYS] Three numerical quantities that are used as a measure of the steady-state errors of an automatic control system when the system is subjected to constant, ramp, or parabolic inputs. { ˌȯd·əˌmad·ik kən'trōl 'er·ər ˌkō·ə'fish·ənt }

**automatic-control frequency response** [CONT SYS] The steady-state output of an automatic control system for sinusoidal inputs of varying frequency. { ˌȯd·əˌmad·ik 'frē·kwən·sē riˌspāns }

**automatic controller** [CONT SYS] An instrument that continuously measures the value of a variable quantity or condition and then automatically acts on the controlled equipment to correct any deviation from a desired preset value. Also known as automatic regulator; controller. { ˌȯd·əˌmad·ik kənˌtrōl·ər }

**automatic-control servo valve** [CONT SYS] A mechanically or electrically actuated servo valve controlling the direction and volume of fluid flow in a hydraulic automatic control system. { ˌȯd·əˌmad·ik kən'trōl 'sər·vō ˌvalv }

**automatic-control stability** [CONT SYS] The property of an automatic control system whose performance is such that the amplitude of transient oscillations decreases with time and the system reaches a steady state. { ˌȯd·əˌmad·ik kən'trōl stəˌbil·ə·dē }

**automatic control system** [CONT SYS] A control system having one or more automatic controllers connected in closed loops with one or more processes. Also known as regulating system. { ˌȯd·əˌmad·ik kən'trōl ˌsis·təm }

**automatic-control transient analysis** [CONT SYS] The analysis of the behavior of the output variable of an automatic control system as the system changes from one steady-state condition to another in terms of such quantities as maximum overshoot, rise time, and response time. { ˌȯd·əˌmad·ik kən'trōl 'tranˌzhənt əˌnal·ə·səs }

**automatic coupling** [MECH ENG] A device which couples rail cars when they are bumped together. { ˌȯd·əˌmad·ik 'kəp·liŋ }

**automatic custody transfer** [PETRO ENG] An automatic system used for measuring and sampling oil or petroleum products at points of receipt or delivery. { ˌȯd·əˌmad·ik 'kəs·təd·ē ˌtranz·fər }

**automatic cutout** [ELEC] A device, usually operated by centrifugal force or by an electromagnet, that automatically shorts part of a circuit at a particular time. { ˌȯd·əˌmad·ik 'kəd,aůt }

**automatic dam** [MIN ENG] In placer mining, a dam with a gate that automatically discharges the water when it reaches a certain height behind the dam. { ˌȯd·əˌmad·ik 'dam }

**automatic data processing** [ENG] The machine performance, with little or no human assistance, of any of a variety of tasks involving informational data; examples include automatic and responsive reading, computation, writing, speaking, directing artillery, and the running of an entire factory. Abbreviated ADP. { ˌȯd·əˌmad·ik ˌdad·ə 'präs,əs·iŋ }

**automatic data-processing auxiliary equipment** [COMPUT SCI] Equipment which is related in function to automatic data-processing equipment, other than peripheral equipment, and whose use is not exclusively and directly used with an automatic data-processing system; when it is so used, it supports the system in off-line operations such as card-punching equipment and paper-tape-preparing equipment; for example, a flexowriter. { ˌȯd·əˌmad·ik ˌdad·ə 'präs,əs·iŋ ȯg'zil·yə·rē i'kwip·mənt }

**automatic data-processing equipment** [COMPUT SCI] Electronic data-processing equipment and punched-card accounting machines, irrespective of use, application, or source of funding. Abbreviated ADPE. { ˌȯd·əˌmad·ik ˌdad·ə 'präs·ˌəs·iŋ i'kwip·mənt }

**automatic data-processing system** [COMPUT SCI] The equipment, personnel program, and application operations involved in the utilization of electronic data-processing equipment, along with associated electric accounting machines, to solve business and logistics data-processing problems, with a minimum of human intervention. { ˌȯd·əˌmad·ik ˌdad·ə 'präs·ˌəs·iŋ ˌsis·təm }

**automatic data-processing system specifications** [COMPUT SCI] A description (devoid of any orientation to the specific equipment of particular suppliers) of a requirement for, and operations to be performed by, automatic data-processing equipment, and generally including a workload description in terms of representative programs (benchmarks) and extension factors. { ˌȯd·əˌmad·ik ˌdad·ə 'präs,əs·iŋ ˌsis·təm ˌspes·ə·fə'kā·shənz }

**automatic degausser** [ELECTR] An arrangement of degaussing coils mounted around a color television picture tube, combined with a special circuit that energizes these coils only while the set is warming up; demagnetizes any parts of the receiver that have been affected by the magnetic field of the earth or of any nearby home appliance. { ˌȯd·əˌmad·ik dē'gaůs·ər }

**automatic dialer** [ELECTR] A device in which a telephone number up to a maximum of 14 digits can be stored in a memory and then activated, directly into the line, by the caller's pressing a button. Also known as mechanical dialer. { ˌȯd·əˌmad·ik 'dīl·ər }

**automatic dictionary** [COMPUT SCI] Any table within a computer memory which establishes a one-to-one correspondence between two sets of characters. { ˌȯd·əˌmad·ik 'dik·shəˌner·ē }

**automatic direction finder** [ELECTR] A direction finder that without manual manipulation indicates the direction of arrival of a radio signal. Abbreviated ADF. Also known as radio compass. { ˌȯd·əˌmad·ik di'rek·shən ˌfīnd·ər }

**automatic door bottom** [ENG] A movable plunger, in the form of a horizontal bar at the bottom of a door, which drops automatically when the door is closed, sealing the threshold and reducing noise transmission. Also known as automatic threshold closer. { ˌȯd·əˌmad·ik 'dȯr ˌbäd·əm }

**automatic drill** [DES ENG] A straight brace for bits whose shank comprises a coarse-pitch screw sliding in a threaded tube with a handle at the end; the device is operated by pushing the handle. { ˌȯd·əˌmad·ik 'dril }

**automatic driller** *See* drilling control. { ˌȯd·əˌmad·ik 'dril·ər }

**automatic drilling control unit** *See* drilling control. { ˌȯd·əˌmad·ik 'dril·iŋ kənˌtrōl ˌyü·nət }

**automatic error correction** [COMMUN] A technique, usually requiring the use of special codes or automatic retransmission, which detects and corrects errors occurring in transmission; the degree of correction depends upon coding and equipment configuration. { ˌȯd·əˌmad·ik 'er·ər kə'rek·shən }

**automatic exchange** [ELECTR] A telephone, teletypewriter, or data-transmission exchange in which communication between subscribers is effected, without the intervention of an operator, by devices set in operation by the originating subscriber's instrument. Also known as automatic switching system; machine switching system. { ˌȯd·əˌmad·ik iks'chanj }

**automatic exposure** [OPTICS] Photoelectric exposure control by a special device that maintains an essentially constant

AUTOMATIC DIALER

A card-dialer-type telephone set used in automatic dialing. *(American Telephone and Telegraph Co.)*

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change to the SPACE level indicates that an ASCII code will start 1-bit-time later. The start bit is always SPACE. The ASCII code follows, least significant bit first. This example is the letter S, binary form (most significant bit, msb, written first): 1 010 011, or 123 in octal form.

The parity bit is optional for error checking. This example uses even parity: the total number of 1s in the ASCII code and the parity bit is even. The bit sequence concludes with one or more stop bits at the MARK level. The minimum number required is set by the receiving device. Standard RS-232-C baud rates (bits per second) include 110, 150, 300, 600, 1200, 2400, 4800, 9600, and 19200. The EIA Standard RS-422 improves upon the RS-232-C by using transmission lines balanced to ground. This improves noise immunity and increases usable baud rates and transmission distance.

Transmissions are classed as **simplex** (one direction only), **half-duplex** (one direction at a time), and **full-duplex** (capable of simultaneous transmission in both directions). An agreed-upon protocol allows the receiver to signal the sender whether or not it is able to accept data. This may be done by a separate line(s) or by special (XON/XOFF; control Q/ control S) ASCII signals on the return path of a full-duplex line.

For parallel transmission, multiple wires carry signals representing all the bits at once. Separate lines indicate when the receiver is ready for new data and when the sender has put new data on the lines. This exchange is called **handshaking.**

The above forms are used for communication between two devices. Where more than two devices are to be interconnected, a network, or bus system, is employed. The IEEE-488 General Purpose Interface Bus, GPIB (based on the Hewlett-Package HP-IB), uses a parallel bus structure and can interconnect up to 15 devices, at a total connection path length of 20 m. One device acts as a controller at any time. See also Sec. 2, Computers, and Sec. 15, Electronics.

# 16.2 AUTOMATIC CONTROLS

**by Ralph L. Moore**

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## INTRODUCTION

The purpose of an **automatic control** on a system is to produce a desired output when inputs to the system are changed. Inputs are in the form of commands, which the output is expected to follow, and disturbances, which the automatic control is expected to minimize. The usual form of an automatic control is a **closed-loop feedback control** which Ahrendt defines as "an operation which, in the presence of a disturbing influence, tends to reduce the difference between the actual state of a system and an arbitrarily varied desired state and which does so on the basis of this difference." The general theories and definitions of automatic control have been developed to aid the designer to meet primarily three basic specifications for the performance of the control system, namely, stability, accuracy, and speed of response.

The **terminology** of automatic control is being constantly updated by the ASME, IEEE, and ISA. Redundant terms, such as *rate, preact,* and *derivative,* for the same controller action are being standardized. Common terminology is still evolving. The introduction of the digital computer as a control device has necessitated the introduction of a whole new subset of terminology. The following terms and definitions have been selected to serve as a reference to a complex area of technology whose breadth crosses several professional disciplines.

**Adaptive control system:** A control system within which automatic means are used to change the system parameters in a way intended to improve the performance of the system.

**Amplification:** The ratio of output to input, in a device intended to increase this ratio. A gain greater than 1.

**Attenuation:** A decrease in signal magnitude between two points, or a gain of less than 1.

**Automatic-control system:** A system in which deliberate guidance or manipulation is used to achieve a prescribed value of a variable and which operates without human intervention.

**Automatic controller:** A device, or combination of devices, which measures the value of a variable, quantity, or condition and operates to correct or limit deviation of this measured value from a selected command (set-point) reference.

**Bode diagram:** A plot of log-gain and phase-angle values on a log-frequency base, for an element, loop, or output transfer function.

**Capacitance:** A property expressible by the ratio of the time integral of the flow rate of a quantity (heat, electric charge) to or from a storage, divided by the related potential charge.